Table 1-4. Asbestosis: Number of deaths by state, U.S. residents age 15 and over, 1990-1999

State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Alabama	21	23	18	23	29	36	43	41	40	44	**318**
Alaska	1	1	1	2	2	–	2	2	5	2	**18**
Arizona	6	6	8	12	9	13	13	15	12	21	**115**
Arkansas	4	6	5	9	5	9	6	6	5	7	**62**
California	102	94	95	93	101	113	100	104	91	107	**1,000**
Colorado	4	5	4	7	12	6	13	9	6	7	**73**
Connecticut	11	14	17	8	7	13	18	13	12	15	**128**
Delaware	6	14	8	8	12	10	10	7	13	21	**109**
District of Columbia	–	1	–	1	2	–	1	–	–	–	**5**
Florida	43	54	52	39	60	67	84	61	65	95	**620**
Georgia	13	10	18	9	12	11	9	12	15	16	**125**
Hawaii	3	4	4	1	2	5	1	1	1	1	**23**
Idaho	4	6	3	2	3	4	4	4	3	7	**40**
Illinois	18	20	21	24	22	21	17	22	28	25	**218**
Indiana	8	4	4	4	6	6	7	7	11	7	**64**
Iowa	4	3	7	3	8	8	4	3	9	5	**54**
Kansas	2	3	7	9	5	10	6	6	4	4	**56**
Kentucky	1	5	5	11	5	3	9	12	10	4	**65**
Louisiana	20	20	14	20	15	18	20	21	27	19	**194**
Maine	17	8	8	13	12	8	6	8	16	15	**111**
Maryland	36	27	33	35	44	53	50	43	45	46	**412**
Massachusetts	36	27	48	25	45	40	39	43	40	37	**380**
Michigan	17	15	16	16	17	27	21	24	16	30	**199**
Minnesota	8	6	17	19	17	18	7	12	18	20	**142**
Mississippi	16	25	25	20	25	34	33	31	25	27	**261**
Missouri	9	11	14	18	13	11	11	11	13	13	**124**
Montana	6	2	4	4	4	–	4	2	6	2	**34**
Nebraska	3	3	2	6	4	4	2	5	1	6	**36**
Nevada	2	3	1	3	6	5	5	3	7	7	**42**
New Hampshire	2	1	4	8	6	6	4	7	6	6	**50**
New Jersey	115	93	80	80	81	93	109	78	93	93	**915**
New Mexico	2	3	1	3	6	8	2	1	1	4	**31**
New York	44	37	30	26	34	43	42	46	47	54	**403**
North Carolina	25	21	25	12	32	29	33	37	50	34	**298**
North Dakota	–	3	–	2	3	–	3	3	2	4	**20**
Ohio	27	24	32	29	31	35	43	43	31	45	**340**
Oklahoma	6	6	5	1	5	5	5	8	9	6	**56**
Oregon	12	22	22	29	26	18	30	21	33	31	**244**
Pennsylvania	67	83	100	114	90	114	106	112	99	77	**962**
Rhode Island	7	1	5	4	6	5	2	4	9	4	**47**
South Carolina	11	8	13	21	13	17	18	24	23	19	**167**
South Dakota	–	–	–	–	–	–	3	–	–	1	**4**
Tennessee	6	8	4	8	13	12	14	18	16	12	**111**
Texas	91	95	54	72	80	93	87	88	98	80	**838**
Utah	3	–	4	5	2	4	5	7	–	6	**36**
Vermont	1	–	3	3	–	2	2	1	2	2	**16**
Virginia	47	36	43	47	38	44	37	41	55	60	**448**
Washington	34	50	40	59	60	44	48	56	60	75	**526**
West Virginia	17	20	28	18	20	32	32	34	28	27	**256**
Wisconsin	9	11	6	10	9	10	3	13	13	15	**99**
Wyoming	1	4	1	4	1	2	3	1	2	–	**19**
TOTAL	**948**	**946**	**959**	**999**	**1,060**	**1,169**	**1,176**	**1,171**	**1,221**	**1,265**	**10,914**

– indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes. SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-5. Asbestosis: Number of deaths, mortality rates (per million population), and years of potential life lost (YPLL) by state, U.S. residents age 15 and over, 1990-1999

State	No. of Deaths	Rank	Crude Mortality Rate	Rank	Age-Adjusted Mortality Rate	Rank	YPLL to Life Expectancy Total	Rank	YPLL/death	Rank
Alabama	318	12	9.59	10	9.29	11	4,047	12	12.7	8
Alaska	18	48	4.12	24	10.62	8	242	47	13.4	2
Arizona	115	25	3.54	29	3.48	31	1,358	26	11.8	28
Arkansas	62	33	3.21	32	2.82	35	819	31	13.2	3
California	1,000	1	4.10	25	4.90	21	11,489	1	11.5	38
Colorado	73	30	2.52	40	3.10	33	905	30	12.4	14
Connecticut	128	22	4.86	22	4.67	23	1,548	23	12.1	19
Delaware	109	28	19.29	1	20.63	1	1,311	27	12.0	23
District of Columbia	5	50	1.08	50	1.12	50	57	50	11.3	40
Florida	620	5	5.40	18	4.05	26	7,087	5	11.4	39
Georgia	125	23	2.25	46	2.75	38	1,641	22	13.1	4
Hawaii	23	45	2.49	42	2.89	34	285	45	12.4	14
Idaho	40	40	4.65	23	4.59	24	453	40	11.3	40
Illinois	218	17	2.37	45	2.37	44	2,579	17	11.8	28
Indiana	64	32	1.42	49	1.41	49	778	33	12.2	18
Iowa	54	36	2.44	44	2.02	48	654	35	12.1	19
Kansas	56	34	2.84	35	2.55	42	649	36	11.6	35
Kentucky	65	31	2.15	48	2.13	46	782	32	12.0	23
Louisiana	194	19	5.96	13	6.55	16	2,466	19	12.7	8
Maine	111	26	11.38	6	10.75	7	1,216	28	11.0	44
Maryland	412	8	10.35	7	12.40	6	5,219	8	12.7	8
Massachusetts	380	10	7.76	12	7.47	13	4,165	11	11.0	44
Michigan	199	18	2.69	37	2.79	36	2,575	18	12.9	7
Minnesota	142	21	4.01	27	4.01	27	1,774	21	12.5	13
Mississippi	261	14	12.81	4	12.71	5	3,398	14	13.0	6
Missouri	124	24	2.99	33	2.69	40	1,505	24	12.1	19
Montana	34	43	5.11	21	4.87	22	407	41	12.0	23
Nebraska	36	41	2.87	34	2.46	43	367	43	10.2	51
Nevada	42	39	3.49	31	4.26	25	528	39	12.6	12
New Hampshire	50	37	5.56	17	6.17	18	580	37	11.6	35
New Jersey	915	3	14.39	3	14.31	3	10,230	3	11.2	43
New Mexico	31	44	2.46	43	2.73	39	365	44	11.8	28
New York	403	9	2.79	36	2.79	36	4,752	9	11.8	28
North Carolina	298	13	5.21	20	5.46	19	3,702	13	12.4	14
North Dakota	20	46	4.08	26	3.63	30	271	46	13.5	1
Ohio	340	11	3.91	28	3.82	28	4,446	10	13.1	4
Oklahoma	56	34	2.21	47	2.05	47	668	34	11.9	27
Oregon	244	16	9.94	9	9.32	10	2,604	16	10.7	47
Pennsylvania	962	2	9.97	8	8.53	12	11,316	2	11.8	28
Rhode Island	47	38	5.89	15	5.21	20	546	38	11.6	35
South Carolina	167	20	5.85	16	6.62	15	1,967	20	11.8	28
South Dakota	4	51	0.73	51	0.60	51	45	51	11.3	40
Tennessee	111	26	2.68	39	2.69	40	1,404	25	12.7	8
Texas	838	4	5.92	14	7.11	14	10,131	4	12.1	19
Utah	36	41	2.69	37	3.42	32	380	42	10.6	48
Vermont	16	49	3.50	30	3.73	29	174	49	10.9	46
Virginia	448	7	8.56	11	10.50	9	5,259	7	11.7	34
Washington	526	6	12.50	5	13.49	4	5,490	6	10.4	49
West Virginia	256	15	17.60	2	15.29	2	3,074	15	12.0	23
Wisconsin	99	29	2.50	41	2.35	45	1,215	29	12.3	17
Wyoming	19	47	5.31	19	6.27	17	198	48	10.4	49

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-6. Asbestosis: Most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1990-1999

CIC	Industry	Number of Deaths	Percent
060	Construction	702	24.6
360	Ship and boat building and repairing	171	6.0
192	Industrial and miscellaneous chemicals	124	4.3
400	Railroads	89	3.1
262	Miscellaneous nonmetallic and stone products	75	2.6
901	General government, n.e.c.	71	2.5
270	Blast furnaces, steelworks, rolling and finishing mills	67	2.3
392	Not specified manufacturing industries	61	2.1
460	Electric light and power	55	1.9
842	Elementary and secondary schools	53	1.9
	All other industries	1,286	45.0
	Industry not reported	105	3.7
	TOTAL	**2,859**	**100.0**

CIC - Census Industry Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-7. Asbestosis: Most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1990-1999

COC	Occupation	Number of Deaths	Percent
585	Plumbers, pipefitters, and steamfitters	238	8.3
019	Managers and administrators, n.e.c.	129	4.5
575	Electricians	125	4.4
567	Carpenters	120	4.2
593	Insulation workers	108	3.8
889	Laborers, except construction	95	3.3
633	Supervisors, production occupations	85	3.0
783	Welders and cutters	78	2.7
453	Janitors and cleaners	74	2.6
804	Truck drivers	66	2.3
	All other occupations	1,639	57.3
	Occupation not reported	102	3.6
	TOTAL	**2,859**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-8. Asbestosis: Proportionate mortality ratio (PMR) adjusted for age, sex, and race by usual industry, U.S. residents age 15 and over, selected states and years, 1990-1999

CIC	Industry	Number of Deaths	PMR	95% Confidence Interval	
				LCL	UCL
262	Miscellaneous nonmetallic mineral and stone products	75	16.39	13.00	20.70
360	Ship and boat building and repairing	171	15.70	13.48	18.29
502	Lumber and construction materials	20	6.95	4.24	10.75
192	Industrial and miscellaneous chemicals	124	4.78	4.00	5.73
211	Other rubber products, and plastics footwear and belting	40	4.31	3.08	5.87
462	Electric and gas, and other combinations	14	3.05	1.66	5.11
180	Plastics, synthetics, and resins	12	2.80	1.44	4.89
200	Petroleum refining	31	2.74	1.86	3.89
272	Primary aluminum industries	16	2.65	1.52	4.31
460	Electric light and power	55	2.65	2.02	3.48
250	Glass and glass products	30	2.58	1.74	3.68
881	Membership organizations	13	2.47	1.31	4.22
060	Construction	702	2.38	2.21	2.57
282	Fabricated structural metal products	28	2.29	1.52	3.30
420	Water transportation	24	2.28	1.46	3.39
210	Tires and inner tubes	15	2.23	1.25	3.69
400	Railroads	89	1.64	1.33	2.03
270	Blast furnaces, steelworks, rolling and finishing mills	67	1.30	1.02	1.67

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-9. Asbestosis: Proportionate mortality ratio (PMR) adjusted for age, sex, and race by usual occupation, U.S. residents age 15 and over, selected states and years, 1990-1999

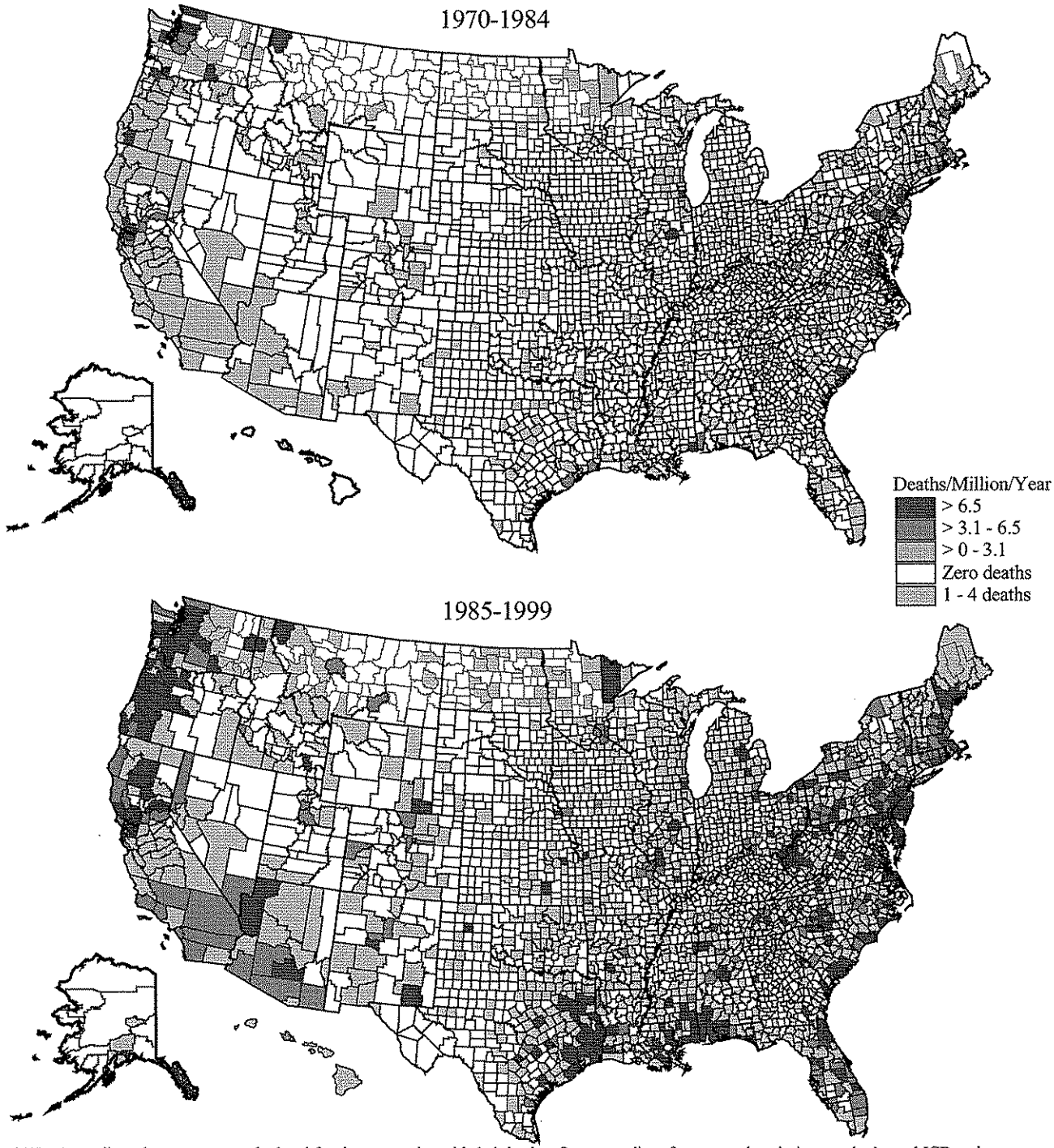
COC	Occupation	Number of Deaths	PMR	95% Confidence Interval	
				LCL	UCL
593	Insulation workers	108	84.30	69.54	102.28
643	Boilermakers	59	20.26	15.59	26.38
585	Plumbers, pipefitters, and steamfitters	238	9.38	8.25	10.68
058	Marine and naval architects	7	8.25	3.31	17.01
646	Lay-out workers	7	8.21	3.30	16.92
584	Plasterers	9	6.43	2.95	12.20
676	Patternmakers, lay-out workers, and cutters	5	6.34	2.05	14.82
653	Sheet metal workers	53	6.14	4.66	8.12
557	Supervisors: plumbers, pipefitters, and steamfitters	7	5.34	2.14	11.01
224	Chemical technicians	8	4.89	2.11	9.62
757	Separating, filtering, and clarifying machine operators	21	4.77	2.94	7.29
829	Sailors and deckhands	12	4.22	2.18	7.37
534	Heating, air conditioning, and refrigeration mechanics	16	4.13	2.36	6.71
544	Millwrights	34	4.10	2.85	5.73
575	Electricians	125	4.10	3.43	4.91
555	Supervisors, electricians, power transmission installers	9	3.62	1.66	6.87
783	Welders and cutters	78	3.08	2.46	3.87
547	Specified mechanics and repairers, n.e.c.	21	2.55	1.58	3.90
518	Industrial machinery repairers	34	2.22	1.54	3.10
563	Brickmasons and stonemasons	26	2.14	1.40	3.14
856	Industrial truck and tractor equipment operators	17	2.09	1.22	3.35
738	Winding and twisting machine operators	11	2.09	1.04	3.73
849	Crane and tower operators	15	2.05	1.14	3.38
696	Stationary engineers	26	1.88	1.23	2.76
503	Supervisors, mechanics and repairers	17	1.85	1.08	2.96
567	Carpenters	120	1.83	1.52	2.20
507	Bus, truck, and stationary engine mechanics	16	1.80	1.03	2.92
549	Not specified mechanics and repairers	22	1.75	1.09	2.65
777	Miscellaneous machine operators, n.e.c.	38	1.62	1.15	2.22
779	Machine operators, not specified	49	1.53	1.13	2.02
633	Supervisors, production occupations	85	1.34	1.08	1.67
869	Construction laborers	58	1.34	1.03	1.74

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.
SOURCE: National Center for Health Statistics multiple cause of death data.

Figure 1-3. Asbestosis: Age-adjusted mortality rates by county, U.S. residents age 15 and over, 1970-1999

NOTE: Age-adjusted rates are not calculated for those counties with 1-4 deaths. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 1-4. Asbestosis: Age-adjusted mortality rates by county, U.S. residents age 15 and over, 1970-1984 and 1985-1999



NOTE: Age-adjusted rates are not calculated for those counties with 1-4 deaths. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-10. Asbestosis: Counties with highest age-adjusted mortality rates (per million population), U.S. residents age 15 and over, 1985-1999

County	State	Age-Adjusted Rate	Crude Rate	Number of Deaths	% Female
Poquoson City	Virginia	140.6	100.8	13	0.0
Orange County	Texas	127.3	108.3	102	3.9
Jackson County	Mississippi	111.2	81.0	110	3.6
Somerset County	New Jersey	105.7	86.5	263	17.1
George County	Mississippi	98.0	88.1	17	0.0
Lincoln County	Montana	96.2	96.2	19	5.3
Sagadahoc County	Maine	82.2	71.2	28	7.1
Kitsap County	Washington	68.1	57.2	137	2.2
Newport News City	Virginia	62.8	42.3	86	4.7
Greene County	Mississippi	61.6	57.9	7	0.0
Hampton City	Virginia	57.6	39.8	64	1.6
Isle of Wight County	Virginia	56.0	49.2	15	0.0
Camden County	New Jersey	52.6	49.6	291	3.1
Jefferson County	Texas	51.4	56.9	159	2.5
York County	Virginia	49.9	26.3	14	0.0
Gloucester County	New Jersey	48.6	40.0	109	1.8
Mason County	West Virginia	47.8	54.6	16	0.0
Jones County	Mississippi	44.7	50.2	36	2.8
Portsmouth City	Virginia	43.7	47.5	57	0.0
Currituck County	North Carolina	42.9	46.6	8	0.0
Washington County	Alabama	41.9	42.5	8	0.0
Putnam County	West Virginia	41.7	36.0	19	0.0
Suffolk City	Virginia	39.8	39.2	24	4.2
Jasper County	Texas	37.7	44.5	16	0.0
Chesapeake City	Virginia	37.7	25.1	47	4.3
Hardin County	Texas	37.0	36.7	18	0.0
Mobile County	Alabama	36.9	35.3	156	1.9
Newton County	Texas	36.4	39.7	6	0.0
Burleson County	Texas	35.6	43.5	7	0.0
Charleston County	South Carolina	34.3	25.1	89	10.1
Kanawha County	West Virginia	34.2	39.9	100	4.0
Berkeley County	South Carolina	33.8	15.0	22	22.7
Sabine County	Texas	29.6	58.6	7	0.0
Solano County	California	27.3	18.1	73	1.4
Delaware County	Pennsylvania	27.3	32.5	214	1.9
Tyler County	Texas	27.0	37.7	8	0.0
Lincoln County	West Virginia	26.0	28.0	7	0.0
Sussex County	Delaware	25.6	31.0	44	4.5
Galveston County	Texas	25.2	19.9	52	0.0
Jasper County	Mississippi	25.1	31.1	6	16.7
Napa County	California	25.0	30.0	41	0.0
Salem County	New Jersey	24.9	27.4	21	4.8
Clarke County	Alabama	24.0	25.5	8	0.0
Wayne County	Mississippi	23.8	23.2	5	0.0
Benton County	Washington	23.7	18.7	25	4.0
Boone County	West Virginia	22.8	19.3	6	0.0
Gloucester County	Virginia	22.2	22.2	8	0.0
Lincoln County	Maine	22.0	27.6	10	10.0
Effingham County	Georgia	21.8	16.5	5	0.0
Allegany County	Maryland	21.6	29.5	27	7.4
Overall United States		**5.0**	**4.9**	**14,507**	**3.6**

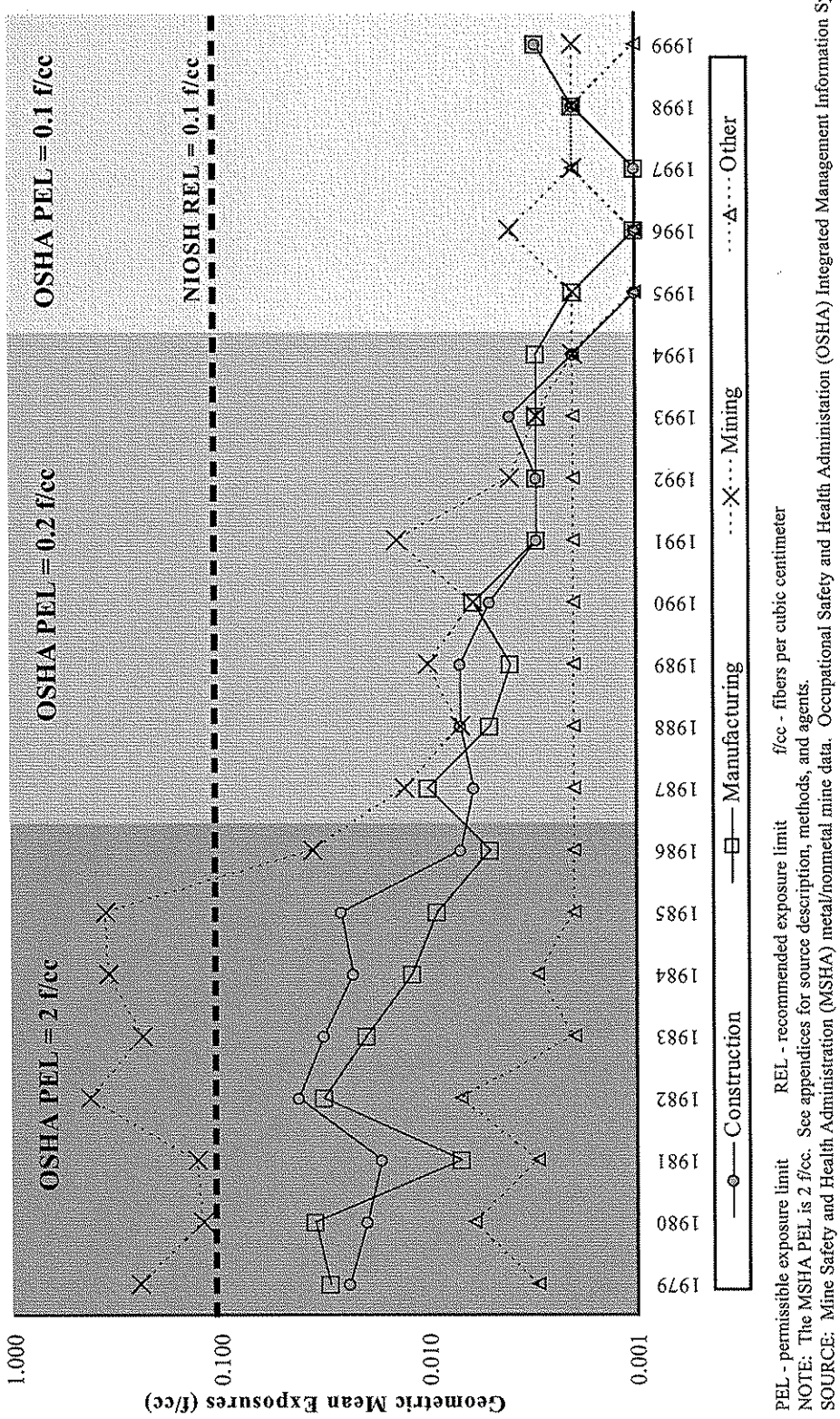
NOTE: Only counties with at least 5 deaths from the disease of interest are included. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-11. Asbestosis: Estimated number of discharges from short-stay nonfederal hospitals, 1970-2000

Year	Number of Discharges
1970	300
1971	400
1972	100
1973	2,000
1974	1,000
1975	1,000
1976	1,000
1977	1,000
1978	3,000
1979	3,000
1980	4,000
1981	2,000
1982	2,000
1983	4,000
1984	6,000
1985	6,000
1986	6,000
1987	11,000
1988	8,000
1989	8,000
1990	5,000
1991	7,000
1992	11,000
1993	8,000
1994	10,000
1995	9,000
1996	13,000
1997	14,000
1998	15,000
1999	14,000
2000	20,000

NOTE: Number of discharges has been rounded. NCHS recommends that, in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution. See appendices for source description and methods.
SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

Figure 1-5. Asbestos: Geometric mean exposures by major industry division, MSHA and OSHA samples, 1979-1999



PEL - permissible exposure limit REL - recommended exposure limit f/cc - fibers per cubic centimeter
NOTE: The MSHA PEL is 2 f/cc. See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration (MSHA) metal/nonmetal mine data. Occupational Safety and Health Administation (OSHA) Integrated Management Information System.

Table 1-12. Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by major industry division, MSHA and OSHA samples, 1979-1999

Industry Division		OSHA PEL = 2 f/cc								OSHA PEL = 0.2 f/cc										OSHA PEL = 0.1 f/cc					
		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Construction SIC 15-17	GM (f/cc)	0.024	0.020	0.017	0.042	0.032	0.023	0.026	0.007	0.006	0.007	0.007	0.005	0.003	0.003	0.004	0.002	0.001	0.001	0.001	0.002	0.003
	No. of samples	97	172	112	168	383	629	474	279	254	254	266	175	214	200	144	82	45	75	52	35	31
	% > PEL	3.1	3.5	1.8	7.7	4.2	5.1	5.3	3.2	4.7	9.1	11.3	9.7	2.8	4.5	1.4	3.7	2.2	0.0	0.0	0.0	12.9
	% > REL	36.1	30.2	22.3	32.1	37.9	32.4	30.4	12.9	9.1	12.2	15.0	13.7	4.7	7.5	4.9	6.1	2.2	0.0	0.0	0.0	12.9
Manufacturing SIC 20-39	GM (f/cc)	0.030	0.035	0.007	0.032	0.020	0.012	0.009	0.005	0.010	0.005	0.004	0.006	0.003	0.003	0.003	0.003	0.002	0.001	0.001	0.002	0.003
	No. of samples	335	313	153	181	372	438	428	278	447	347	292	203	277	142	131	76	108	149	48	33	18
	% > PEL	3.0	7.7	0.7	1.1	4.6	2.3	2.3	2.5	16.6	6.3	6.2	11.8	7.9	0.0	5.3	0.0	0.9	1.3	0.0	0.0	5.6
	% > REL	37.3	41.2	14.4	35.4	27.2	26.3	21.0	10.1	21.5	13.3	10.6	15.8	10.5	1.4	9.9	3.9	0.9	1.3	0.0	0.0	5.6
Mining SIC 10-12, 14	GM (f/cc)	0.244	0.121	0.129	0.430	0.239	0.346	0.339	0.036	0.013	0.007	0.010	0.006	0.014	0.004	0.003	0.002	0.002	0.004	0.002	0.002	0.002
	No. of samples	204	301	276	64	73	23	43	37	16	53	29	46	34	28	14	157	77	28	7	3	2
	% > PEL	10.8	5.6	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	2.9	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% > REL	70.6	60.8	60.9	90.6	78.1	91.3	86.0	48.6	12.5	18.9	20.7	19.6	32.4	7.1	7.1	0.6	0.0	10.7	0.0	0.0	0.0
Other SIC 1-9, 13, 40-99	GM (f/cc)	0.003	0.006	0.003	0.007	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.001
	No. of samples	94	124	68	51	469	834	732	505	814	509	625	472	462	285	231	214	144	166	136	93	71
	% > PEL	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.0	0.6	0.5	0.2	0.0	0.0	0.0	0.0	0.7	0.6	0.0	0.0	0.0
	% > REL	7.4	13.7	2.9	9.8	1.5	2.6	2.3	1.0	1.4	1.8	1.0	0.6	0.4	1.1	1.3	0.5	0.7	0.6	0.0	0.0	0.0

SIC - Standard Industrial Classification PEL - permissible exposure limit REL - recommended exposure limit GM - geometric mean f/cc - fibers per cubic centimeter
NOTE: The MSHA PEL is 2 f/cc. The NIOSH REL is 0.1 f/cc. See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration (MSHA) metal/nonmetal mine data. Occupational Safety and Health Administration (OSHA) Integrated Management Information System.

Table 1-13. Asbestos: Number of samples, geometric mean exposures, and percent exceeding designated occupational exposure limits by industries with elevated asbestosis mortality, MSHA and OSHA samples, 1990-1999

Asbestosis Mortality, Selected States and Years, 1990-1999							
CIC	Industries with elevated PMRs and most frequently recorded on death certificates	Number of Deaths	PMR	Number of Samples	GM (f/cc)	% > PEL	% > REL
262	Miscellaneous nonmetallic mineral and stone products	75	16.39	115	0.031	26.1	40.9
360	Ship and boat building and repairing	171	15.70	21	0.002	0.0	9.5
192	Industrial and miscellaneous chemicals	124	4.78	19	0.003	0.0	5.3
211	Other rubber products, and plastics footwear and belting	40	4.31	28	0.002	0.0	0.0
200	Petroleum refining	31	2.74	11	0.001	0.0	0.0
460	Electric light and power	55	2.65	41	0.002	0.0	0.0
250	Glass and glass products	30	2.58	8	0.004	0.0	0.0
060	Construction	702	2.38	1,051	0.003	4.0	6.3
400	Railroads	89	1.64	9	0.001	0.0	0.0
270	Blast furnaces, steelworks, rolling and finishing mills	67	1.30	26	0.002	0.0	0.0
	All other industries	1,370		3,561	0.002	1.0	2.1
	TOTAL			**4,890**	**0.002**	**2.2**	**3.9**

CIC - Census Industry Code PEL - permissible exposure limit REL - recommended exposure limit PMR - proportionate mortality ratio
GM - geometric mean f/cc - fibers per cubic centimeter
NOTE: The MSHA PEL is 2 f/cc. The OSHA PEL is 2 f/cc before July 21, 1986, 0.2 f/cc from July 21, 1986 to October 10, 1994, and 0.1 f/cc after October 10, 1994. The NIOSH REL is 0.1 f/cc. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Mine Safety and Health Administration (MSHA) metal/nonmetal mine data. Occupational Safety and Health Administration (OSHA): Integrated Management Information System. National Center for Health Statistics multiple cause of death data.

Table 1-14 (page 1 of 2). Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by MSHA metal/nonmetal district and state, MSHA samples, 1979-1999

MSHA Metal/Nonmetal District	All years		1979 - 1986				1987 - 1994				1995 - 1999			
	No. of Samples	GM (f/cc)	No. of Samples	GM (f/cc)	% > PEL	% > REL	No. of Samples	GM (f/cc)	% > PEL	% > REL	No. of Samples	GM (f/cc)	% > PEL	%> REL
Northeast	**318**	**0.159**	**240**	**0.430**	**6.3**	**85.0**	**70**	**0.009**	**7.1**	**21.4**	**8**	**0.002**	**0.0**	**0.0**
Connecticut	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Delaware	0	–	0	–	–	–	0	–	–	–	0	–	–	–
District of Columbia	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Maine	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Maryland	45	0.021	26	0.119	0.0	53.8	18	0.002	0.0	0.0	1	0.002	0.0	0.0
Massachusetts	1	0.002	0	–	–	–	1	0.002	0.0	0.0	0	–	–	–
New Hampshire	0	–	0	–	–	–	0	–	–	–	0	–	–	–
New Jersey	14	0.191	14	0.191	0.0	78.6	0	–	–	–	0	–	–	–
New York	40	0.187	34	0.439	0.0	91.2	6	0.002	0.0	0.0	0	–	–	–
Pennsylvania	19	0.001	0	–	–	–	12	0.002	0.0	0.0	7	0.002	0.0	0.0
Rhode Island	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Vermont	176	0.560	154	0.599	9.7	89.6	22	0.350	22.7	68.2	0	–	–	–
Virginia	20	0.031	12	0.239	0.0	83.3	8	0.002	0.0	0.0	0	–	–	–
West Virginia	3	0.002	0	–	–	–	3	0.002	0.0	0.0	0	–	–	–
Southeast	**91**	**0.036**	**71**	**0.086**	**5.6**	**42.3**	**14**	**0.002**	**0.0**	**0.0**	**6**	**0.002**	**0.0**	**0.0**
Alabama	1	0.020	0	–	–	–	1	0.020	0.0	0.0	0	–	–	–
Florida	6	0.013	6	0.013	0.0	33.3	0	–	–	–	0	–	–	–
Georgia	8	0.124	4	10.3	100.0	100.0	2	0.002	0.0	0.0	2	0.002	0.0	0.0
Kentucky	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Mississippi	0	–	0	–	–	–	0	–	–	–	0	–	–	–
North Carolina	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Puerto Rico	0	–	0	–	–	–	0	–	–	–	0	–	–	–
South Carolina	76	0.035	61	0.076	0.0	39.3	11	0.002	0.0	0.0	4	0.002	0.0	0.0
Tennessee	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Virgin Islands	0	–	0	–	–	–	0	–	–	–	0	–	–	–
North Central	**354**	**0.007**	**119**	**0.075**	**0.8**	**45.4**	**172**	**0.002**	**0.0**	**1.7**	**63**	**0.002**	**0.0**	**0.0**
Illinois	11	0.038	9	0.079	0.0	55.6	2	0.002	0.0	0.0	0	–	–	–
Indiana	1	0.010	1	0.010	0.0	0.0	0	–	–	–	0	–	–	–
Iowa	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Michigan	176	0.002	2	0.002	0.0	0.0	134	0.002	0.0	0.0	40	0.001	0.0	0.0
Minnesota	161	0.027	106	0.083	0.9	46.2	34	0.005	0.0	8.8	21	0.001	0.0	0.0
Ohio	1	0.010	1	0.010	0.0	0.0	0	–	–	–	0	–	–	–
Wisconsin	4	0.002	0	–	–	–	2	0.002	0.0	0.0	2	0.004	0.0	0.0

See footnotes at end of table.

Table 1-14 (page 2 of 2). Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by MSHA metal/nonmetal district and state, MSHA samples, 1979-1999

MSHA Metal/Nonmetal District	All years		1979 - 1986				1987 - 1994				1995 - 1999			
	No. of Samples	GM (f/cc)	No. of Samples	GM (f/cc)	% > PEL	% > REL	No. of Samples	GM (f/cc)	% > PEL	% > REL	No. of Samples	GM (f/cc)	% > PEL	%> REL
South Central	**304**	**0.017**	**231**	**0.035**	**1.3**	**39.0**	**47**	**0.002**	**0.0**	**2.1**	**26**	**0.001**	**0.0**	**0.0**
Arkansas	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Louisiana	45	0.002	0	–	–	–	45	0.002	0.0	2.2	0	–	–	–
Missouri	0	–	0	–	–	–	0	–	–	–	0	–	–	–
New Mexico	112	0.042	112	0.042	1.8	42.9	0	–	–	–	0	–	–	–
Oklahoma	27	0.033	27	0.033	0.0	40.7	0	–	–	–	0	–	–	–
Texas	120	0.014	92	0.028	1.1	33.7	2	0.002	0.0	0.0	26	0.001	0.0	0.0
Rocky Mountain	**254**	**0.211**	**225**	**0.324**	**4.9**	**87.1**	**29**	**0.008**	**0.0**	**20.7**	**0**	**0.000**	**0.0**	**0.0**
Arizona	89	0.525	89	0.525	11.2	92.1	0	–	–	–	0	–	–	–
Colorado	35	0.055	31	0.088	0.0	64.5	4	0.002	0.0	0.0	0	–	–	–
Kansas	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Montana	74	0.278	62	0.376	1.6	91.9	12	0.058	0.0	50.0	0	–	–	–
Nebraska	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Nevada	6	0.002	0	–	–	–	6	0.002	0.0	0.0	0	–	–	–
North Dakota	0	–	0	–	–	–	0	–	–	–	0	–	–	–
South Dakota	47	0.157	41	0.287	0.0	90.2	6	0.003	0.0	0.0	0	–	–	–
Utah	3	0.005	2	0.010	0.0	0.0	1	0.002	0.0	0.0	0	–	–	–
Wyoming	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Western	**194**	**0.158**	**135**	**0.389**	**14.8**	**83.0**	**45**	**0.025**	**0.0**	**37.8**	**14**	**0.010**	**0.0**	**21.4**
Alaska	0	–	0	–	–	–	0	–	–	–	0	–	–	–
California	185	0.195	128	0.515	15.6	87.5	43	0.029	0.0	39.5	14	0.010	0.0	21.4
Hawaii	1	0.002	0	–	–	–	1	0.002	0.0	0.0	0	–	–	–
Idaho	1	0.002	0	–	–	–	1	0.002	0.0	0.0	0	–	–	–
Oregon	0	–	0	–	–	–	0	–	–	–	0	–	–	–
Washington	7	0.002	7	0.002	0.0	0.0	0	–	–	–	0	–	–	–
TOTAL	**1,515**	**0.046**	**1,021**	**0.165**	**5.3**	**67.2**	**377**	**0.004**	**1.3**	**11.1**	**117**	**0.002**	**0.0**	**2.6**

– indicates incalculable field

PEL - permissible exposure limit REL - recommended exposure limit GM - geometric mean f/cc - fibers per cubic centimeter

NOTE: The MSHA PEL is 2 f/cc. The NIOSH REL is 0.1 f/cc. See appendices for source description, methods, and agents.

SOURCE: Mine Safety and Health Administration (MSHA) metal/nonmetal mine data.

Table 1-15 (page 1 of 3). Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region and state, OSHA samples, 1979-1999

OSHA Region	All years		1979 – 1986 OSHA PEL=2 f/cc				1987 – 1994 OSHA PEL=0.2 f/cc				1995 – 1999 OSHA PEL=0.1 f/cc NIOSH REL=0.1 f/cc		
	Number of Samples	GM (f/cc)	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL
Region 1	**1,430**	**0.006**	**836**	**0.014**	**5.0**	**27.0**	**500**	**0.002**	**4.2**	**5.6**	**94**	**0.001**	**0.0**
Connecticut	619	0.003	319	0.005	1.3	16.0	254	0.001	0.0	0.4	46	0.001	0.0
Maine	103	0.008	83	0.010	2.4	16.9	20	0.004	20.0	20.0	0	–	–
Massachusetts	481	0.014	285	0.032	10.2	38.6	172	0.005	7.0	10.5	24	0.001	0.0
New Hampshire	156	0.007	89	0.021	1.1	37.1	44	0.002	2.3	2.3	23	0.001	0.0
Rhode Island	70	0.033	60	0.032	10.0	30.0	9	0.062	44.4	44.4	1	0.002	0.0
Vermont	1	0.002	0	–	–	–	1	0.002	0.0	0.0	0	–	–
Region 2	**2,891**	**0.004**	**1,279**	**0.006**	**1.5**	**14.9**	**1,359**	**0.003**	**4.3**	**6.7**	**253**	**0.002**	**2.4**
New Jersey	700	0.008	384	0.010	2.9	20.8	288	0.006	14.9	20.8	28	0.001	0.0
New York	2,061	0.003	861	0.005	0.9	12.5	991	0.003	1.2	2.6	209	0.002	2.9
Puerto Rico	109	0.002	29	0.003	0.0	6.9	64	0.002	1.6	4.7	16	0.001	0.0
Virgin Islands	21	0.005	5	0.002	0.0	0.0	16	0.007	12.5	12.5	0	–	–
Region 3	**1,773**	**0.010**	**1,043**	**0.013**	**3.4**	**25.8**	**659**	**0.007**	**14.0**	**18.4**	**71**	**0.001**	**0.0**
Delaware	22	0.022	20	0.029	0.0	40.0	2	0.002	0.0	0.0	0	–	–
District of Columbia	131	0.003	114	0.003	0.9	10.5	17	0.001	0.0	0.0	0	–	–
Maryland	129	0.003	71	0.003	0.0	4.2	31	0.008	16.1	19.4	27	0.001	0.0
Pennsylvania	1,014	0.008	587	0.013	3.4	25.7	394	0.004	5.6	7.9	33	0.001	0.0
Virginia	362	0.041	163	0.060	7.4	45.4	198	0.031	29.8	39.4	1	0.0003	0.0
West Virginia	115	0.010	88	0.012	2.3	23.9	17	0.015	35.3	35.3	10	0.001	0.0
Region 4	**2,128**	**0.004**	**714**	**0.014**	**4.1**	**24.6**	**1,085**	**0.003**	**2.0**	**4.2**	**331**	**0.002**	**0.9**
Alabama	187	0.009	104	0.020	6.7	28.8	74	0.003	0.0	0.0	9	0.008	11.1
Florida	269	0.003	93	0.008	3.2	14.0	161	0.002	1.9	3.7	15	0.001	0.0
Georgia	336	0.009	217	0.015	7.4	25.3	112	0.003	3.6	8.9	7	0.001	0.0
Kentucky	351	0.003	104	0.004	0.0	5.8	194	0.003	0.5	2.6	55	0.002	0.0
Mississippi	138	0.005	33	0.099	3.0	63.6	87	0.002	0.0	0.0	18	0.001	0.0
North Carolina	472	0.005	87	0.055	2.3	47.1	230	0.005	4.3	7.4	155	0.001	0.0
South Carolina	188	0.002	45	0.008	0.0	20.0	114	0.001	2.6	2.6	29	0.001	0.0
Tennessee	187	0.004	31	0.003	0.0	3.2	113	0.004	0.9	4.4	43	0.003	4.7

See footnotes at end of table.

Table 1-15 (page 2 of 3). Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region and state, OSHA samples, 1979-1999

OSHA Region	All years		1979 – 1986 PEL=2 f/cc				1987 – 1994 PEL=0.2 f/cc				1995 – 1999 OSHA PEL=0.1 f/cc NIOSH REL=0.1 f/cc		
	Number of Samples	GM (f/cc)	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL
Region 5	**3,255**	**0.004**	**1,301**	**0.010**	**1.9**	**19.4**	**1,722**	**0.003**	**2.0**	**3.4**	**232**	**0.001**	**0.4**
Illinois	835	0.003	352	0.007	0.0	12.8	434	0.002	0.0	0.7	49	0.001	0.0
Indiana	440	0.006	213	0.033	4.2	41.8	152	0.001	0.0	0.7	75	0.001	0.0
Michigan	453	0.002	36	0.001	0.0	0.0	376	0.002	1.9	2.7	41	0.003	2.4
Minnesota	61	0.003	14	0.010	14.3	21.4	47	0.002	0.0	2.1	0	–	–
Ohio	863	0.005	381	0.009	0.8	18.4	435	0.004	5.5	7.8	47	0.001	0.0
Wisconsin	603	0.006	305	0.012	3.6	15.1	278	0.003	1.4	3.2	20	0.001	0.0
Region 6	**1,315**	**0.005**	**695**	**0.007**	**1.7**	**15.5**	**557**	**0.004**	**5.6**	**9.9**	**63**	**0.001**	**0.0**
Arkansas	253	0.005	100	0.005	4.0	13.0	143	0.006	7.0	14.0	10	0.001	0.0
Louisiana	121	0.005	69	0.006	1.4	8.7	52	0.003	1.9	1.9	0	–	–
New Mexico	30	0.002	2	0.002	0.0	0.0	27	0.002	0.0	0.0	1	0.001	0.0
Oklahoma	166	0.006	108	0.008	4.6	15.7	49	0.003	4.1	6.1	9	0.004	0.0
Texas	745	0.005	416	0.008	0.5	17.3	286	0.004	6.3	10.8	43	0.001	0.0
Region 7	**1,304**	**0.004**	**910**	**0.006**	**1.9**	**10.9**	**373**	**0.002**	**1.1**	**1.1**	**21**	**0.001**	**0.0**
Iowa	339	0.004	230	0.006	2.6	14.8	106	0.002	0.0	0.0	3	0.001	0.0
Kansas	247	0.010	177	0.018	2.8	19.2	64	0.003	3.1	3.1	6	0.001	0.0
Missouri	548	0.003	416	0.004	1.4	6.0	126	0.002	1.6	1.6	6	0.001	0.0
Nebraska	170	0.003	87	0.004	0.0	6.9	77	0.002	0.0	0.0	6	0.001	0.0
Region 8	**628**	**0.005**	**445**	**0.007**	**0.9**	**15.1**	**158**	**0.003**	**2.5**	**3.2**	**25**	**0.001**	**0.0**
Colorado	320	0.005	226	0.005	0.4	14.2	82	0.004	4.9	6.1	12	0.001	0.0
Montana	164	0.009	134	0.012	2.2	21.6	27	0.003	0.0	0.0	3	0.001	0.0
North Dakota	16	0.003	9	0.006	0.0	11.1	0	–	–	–	7	0.001	0.0
South Dakota	66	0.002	32	0.003	0.0	6.3	33	0.001	0.0	0.0	1	0.001	0.0
Utah	35	0.012	22	0.023	0.0	13.6	12	0.005	0.0	0.0	1	0.001	0.0
Wyoming	27	0.003	22	0.003	0.0	0.0	4	0.010	0.0	0.0	1	0.001	0.0

See footnotes at end of table.

Table 1-15 (page 3 of 3). Asbestos: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region and state, OSHA samples, 1979-1999

OSHA Region	All years		1979 – 1986 PEL=2 f/cc				1987 – 1994 PEL=0.2 f/cc				1995 – 1999 OSHA PEL=0.1 f/cc NIOSH REL=0.1 f/cc		
	Number of Samples	GM (f/cc)	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL	% > REL	Number of Samples	GM (f/cc)	% > PEL
Region 9	**715**	**0.002**	**177**	**0.003**	**0.6**	**9.0**	**471**	**0.002**	**3.2**	**6.2**	**67**	**0.004**	**0.0**
American Samoa	0	–	0	–	–	–	0	–	–	–	0	–	–
Arizona	103	0.004	45	0.002	0.0	8.9	56	0.006	1.8	3.6	2	0.043	0.0
California	450	0.003	71	0.004	1.4	12.7	320	0.002	3.4	7.2	59	0.004	0.0
Guam	3	0.000	3	0.0003	0.0	0.0	0	–	–	–	0	–	–
Hawaii	50	0.001	29	0.001	0.0	3.4	19	0.001	0.0	0.0	2	0.001	0.0
Nevada	109	0.002	29	0.004	0.0	6.9	76	0.001	3.9	5.3	4	0.003	0.0
Region 10	**568**	**0.005**	**289**	**0.007**	**2.4**	**16.3**	**232**	**0.003**	**0.9**	**3.4**	**47**	**0.001**	**2.1**
Alaska	220	0.003	149	0.003	1.3	2.7	50	0.004	2.0	2.0	21	0.002	0.0
Idaho	95	0.003	27	0.013	0.0	22.2	66	0.002	0.0	0.0	2	0.001	0.0
Oregon	154	0.011	107	0.013	2.8	29.9	41	0.010	0.0	9.8	6	0.003	16.7
Washington	99	0.003	6	0.385	33.3	83.3	75	0.003	1.3	4.0	18	0.001	0.0
TOTAL	**16,007**	**0.005**	**7,689**	**0.009**	**2.5**	**18.9**	**7,116**	**0.003**	**4.0**	**6.3**	**1,204**	**0.001**	**0.9**

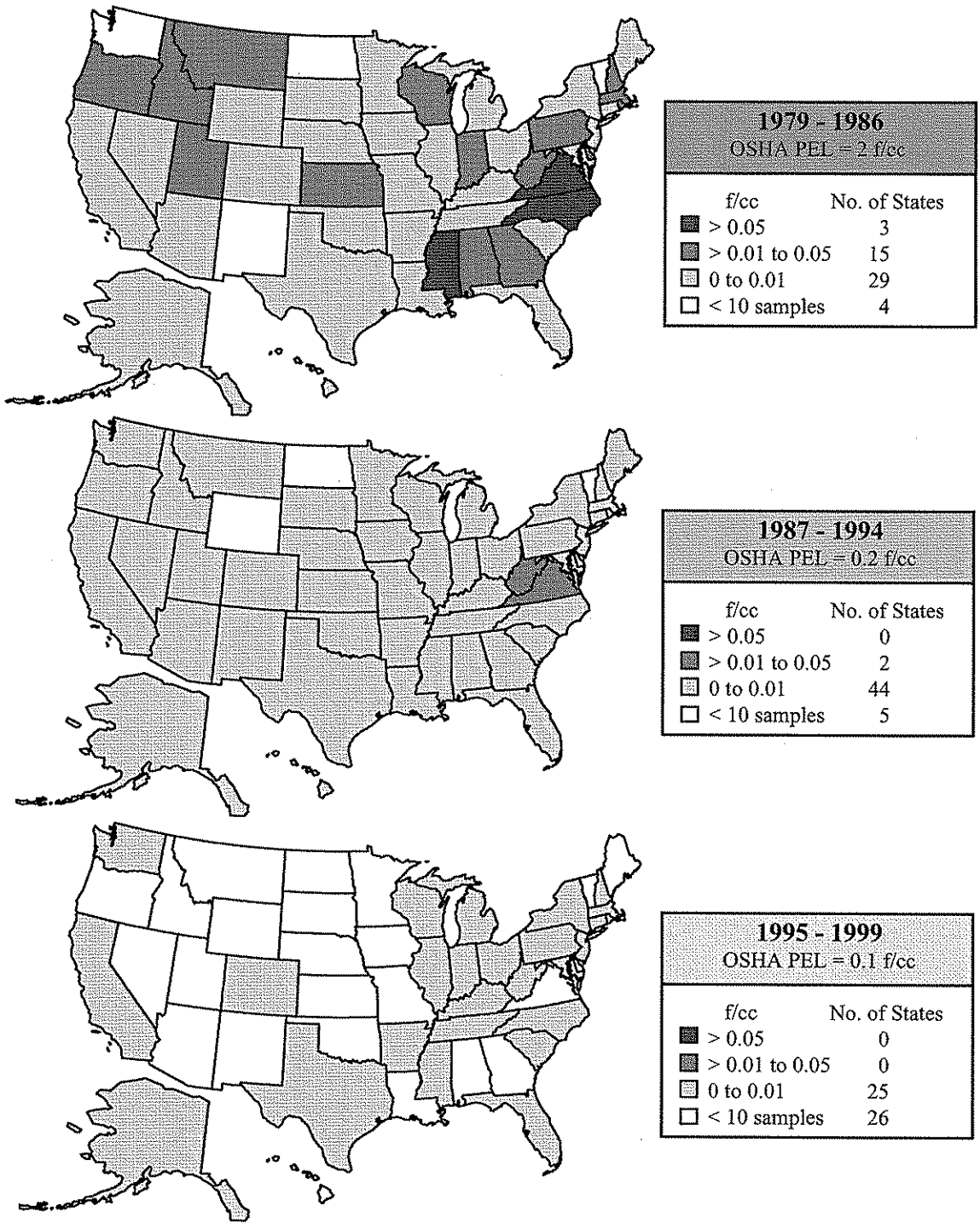
– indicates incalculable field

PEL - permissible exposure limit REL - recommended exposure limit GM - geometric mean f/cc - fibers per cubic centimeter

NOTE: The NIOSH REL is 0.1 f/cc. See appendices for source description, methods, and agents.

SOURCE: Occupational Safety and Health Administation (OSHA) Integrated Management Information System.

Figure 1-6. Asbestos: Geometric mean exposures by state, OSHA samples, 1979-1999



PEL - permissible exposure limit REL - recommended exposure limit f/cc - fibers per cubic centimeter
NOTE: The NIOSH REL is 0.1 f/cc. See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration (OSHA) Integrated Management Information System.